IN THE CLAIMS

Please amend and cancel the claims as indicated in the claims listing attached hereto.

DISCUSSION AND COMMENTS

Specification Objections

The Examiner has objected to the specification as containing specifically noted informalities. Applicant thanks the Examiner for his close reading of the claims and has amended the wording of the specification to overcome the specified informalities.

Claim Objections

Applicant has amended claims 9 and 13 to correct the informalities noted by the Examiner.

Claim Rejections – 35 USC 112

Claims 13-15 have been rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention in the cited claims for specified reasons.

In response, applicant has taken the following actions to overcome the bases for rejection of these claims:

Supporting structures referred to in the claims have been identified as those anatomical supporting structures for the teeth, i.e., bone, periodontal ligaments and gingiva around the root and cervical region of the tooth.

Proper antecedent basis has been provided for the appearance of the term "the projected fiduciary shape" in the subject claims.

"An ideal fiduciary image" has been defined in the claim structure as being the ideal fiduciary image projected onto the surfaces of the at least one radiation detectors by exposure of the fiduciary element to a radiation source perpendicular to the surface of the at least one radiation detectors.

With these clarifications and amendments to the claims, Applicant believes the claims to have overcome the bases for rejected noted by the Examiner and that they are now in condition for allowance. Accordingly, withdrawal of the rejection of these claims and their passage to allowance is respectfully requested.

Claim Rejections – 35 USC 102

Claims 9-12 have been rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 1,286,251 to Dorr ("Dorr").

Dorr provides a "Mouth Film-Holder" that acts as an interchangeable means for holding skiagraph film in the mouth of a subject for the purpose of receiving an impression of teeth, tooth roots, or external jaw structure above or below a line of closure.

Claim 9 has been amended to clarify and distinguish more clearly over the Dorr reference.

The present invention, as per claim 9, as now amended, provides a radiation sensor for use with a digital radiography imaging system for intraoral placement in a mouth of a patient for production of radiographs of teeth and supporting structures. The

sensor has integrally formed in a housing at least two, generally planar, digital radiation detectors abutting at a non-zero angle to form a faceted, generally contiguous imaging surface oriented toward a radiation source. The housing is angled to conform to the anatomic curvatures of the human maxillary and mandibular arches of the average patient, said teeth and supporting structures casting a projected image on the two radiation detectors when illuminated by the radiation source.

First, it must be noted that the structure of claim 9 is not directed toward a "Mouth Film-Holder" that holds a skiagraph film in a patient's mouth. It is a sensor in and of itself. Unlike Dorr, claim 9 structure does not hold an interchangeable sensor in place as is the purpose and stated object of the Dorr reference. The radiation sensor of claim 9 is a sensing element itself being anatomically conformed to its operational use. This is not taught nor suggested by the Dorr reference which clearly limits itself to being a Mouth Film-Holder and not a sensor.

Second, claim 9 structure claims a radiation sensor having integrally formed in a housing, at least two, generally planar, digital radiation detectors abutting at a non-zero angle to form a faceted, generally contiguous imaging surface oriented toward a radiation source. Dorr teaches and claims a carrying structure for skiagraph film that includes having sections at an oblique angle to one another, but makes no claim to structure having at least two sensors integrally formed with its carrying structure as applicant's sensor in claim 9. In fact, there is no holder in applicant's claim 9 structure, there is only a sensor with no provision for frictionally holding an external,separate sensor in place as taught and claimed in Dorr.

Further analysis shows that the Dorr structure and that of Claim 9 are

incompatible for their stated purposes. Dorr teaches frictional holding of an external, releasable skiagraphic film by a recurved member. There is no provision for retention of any external sensor member in Claim 9 structure. In fact, since the claimed detectors are integral with the housing forming the radiation sensor, any attempt to add, frictionally or otherwise, additional sensors to the housing would result in an overlap and conflict with the integrated detector elements rendering an inoperative structure.

Accordingly, since claim 9, as amended, is directed towards a sensor having detector elements integral with an anatomically conforming housing and not toward a holder for interchangeable skiagraph film, applicant believes that the claimed structure is patentable over the Dorr reference. Claims 10-12 are dependent upon claim 9 and further delineate the inventive structure by adding additional structural limitations. As such, applicant further believes that they also are patentable over the Dorr reference. Applicant therefore respectfully requests the withdrawal of the rejection of these claims and their passage to allowance.

Claim Rejections – 35 USC 103

Claims 1-8 have been rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 1,286,251 to Dorr in view of U.S. Patent No. 4,941,164 to Schuller et al. ("Schuller").

Schuller teaches a method for aligning radiographic images taken at different times, thereby facilitating the determination of a dental structure by placing a particular spatial pattern of marker elements in juxtaposition to the structure being imaged, so that the shadows of the elements arise on the respective images. A computing device is then

used to rotate, translate and alter the scale of one image with respect to the other until the shadows of the elements on one image coincide as closely as possible with those appearing on the other image.

Applicant's claims 1-8 are for a radiation sensor for use with a digital radiography imaging system for intraoral placement in a mouth of a patient for production of radiographs of teeth and supporting structures that is used not to align a time evolution of imaged pictures, but instead is used to determine and correct for projected distortions on the sensor's detecting elements caused by a non-orthogonal relationship between the angle of the radiating beam and the plane of the sensor's detecting elements for a single imaged picture.

Applicant has amended the subject claim language to indicate that the sensor structure claimed is not for alignment purposes of multiple, time evolved images, but instead is used in a single image being processed by a radiography imaging system to correct for projective distortions caused by non-perpendicularity of the radiation beam to the imaging plane of the sensor.

Specifically, the claims are directed toward an inventive structure that is utilized in a digital radiography imaging system that uses the projected distorted image shape of an element having a known geometry onto a radiation detector for comparison against a known non-distorted projected image shape of the element in order to generate a corrective transformation for image data to correct distortions in the image. The claimed structure is for a radiation sensor used for intraoral placement in a mouth of a patient with such a digital radiography imaging system for production of radiographs of teeth and supporting structures. As such, it is clearly distinguished from the teaching of Schuller

for a particular spatial pattern of marker elements associated with a radiation sensor for determining alignment of multiple, time evolved images of the same structure.

Schuller states in its General Description of This Invention at column 2, starting at line 25 et seq. that

> "this invention involves the provision of a plurality of marker elements in a specific, repeatable spatial juxtaposition with respect to the animal tissues being investigated (for example the teeth), such that the radiographic images contain the shadows of the marker elements. ... The microprocessor or computing device then operates on one of the pixel arrays by first identifying the shadows of the marker elements, and then bringing the geometric coordinates of the marker element shadows on one array into substantially overlying relationship with the geometric coordinates of the marker element shadows on the other array...." This confirms that the Schuller marker elements operate to cast an alignment shadow that is to be used in aligning multiple images taken of the same subject. There is no suggestion, teaching or disclosure in Schuller that any element, such as claimed by Applicant, for at least one radio-opaque fiduciary element of known shape, size and location be located intermediate the radiation source and the sensor's imaging surface to cast a projected image on the surface when illuminated by a radiation source for determining an unknown angle of incidence between the radiation source and imaging surface by comparing the projected image shape of the fiduciary element against a projected image shape of the fiduciary element generated by a known angle of incidence to correct for projective distortion in the projected image shape caused by the unknown angle of incidence.

Applicant's fiduciary elements appearing in the claimed sensor structure then, while being argued to be topologically similar to the alignment elements used in Schuller's method claims, must be conceded to act and perform in a significantly different manner and exclusively than that of Schuller's alignment elements.

Specifically, Schuller's elements do not provide any projected images whose distortion is useful for correcting projective distortion in a single image due to an unknown angle of incidence between the radiation source and the imaging surface. Schuller neither discloses nor teaches their use for comparing their projected image shape against their projected image shape generated by a known angle of incidence to correct for projective distortion in the projected image shape caused by the unknown angle of incidence. They are useful only in an alignment situation involving multiple time evolved images of the same scene.

Likewise, Applicant's fiduciary elements find their use in determining distortion correction in a single projected image and are not useful for alignment purposes in such single image.

The fact that these two structures are exclusive is shown by an attempt at substitution of one for the other. Schuller's elements project a shadow but have no known projected shadow datum against which they can be used to determine a correcting transformation for distortions introduced into an image due to a non-orthogonal incidence angle of the radiation beam. Applicant's fiduciary elements are selected to have a known projected image shape on the imaging surface that is

produced by a known angle of incidence between the radiation source and the imaging surface that can be used as a datum for projective distortion correction.

This limitation on Applicant's fiduciary elements is neither found nor suggested in Schuller but is needed for determining an unknown angle of incidence between the radiation source and the imaging surface by comparing the projected image shape of the fiduciary element against the projected image shape of the fiduciary element generated by a known angle of incidence to correct for projective distortion in the projected image shape caused by the unknown angle of incidence. Schuller's elements, lacking this claimed structural requirement as it would not be needed for their stated purpose and application of alignment of multiple, time evolved images, could not be substituted for Applicant's fiduciary elements to correct distortion as taught. Were they so substituted, the radiographic imaging system in which Applicant's sensor is designed to operate would be rendered inoperative.

Accordingly, since Schuller's structure is designed to operate in an environment and for a purpose distinct from that of Applicant's claimed structure and operating environment, Applicant respectfully believes that the Schuller reference fails to add missing elements to the Dorr reference that would render Applicant's claimed inventive structure in claims 1-8 unpatentable under 35 USC 103. Applicant respectfully requests that the rejection of these claims be withdrawn and that claims 1-8, as amended, being in condition for allowance, be allowed.

In conclusion, Applicant has responded to pending Office Action dated November 30, 2005 by amending the claims making them more definite as to the subject matter

being claimed, and by distinguishing the claimed invention as being patentable over the references cited by the Examiner in refusing allowance. With this response Applicant believes the application to now be in condition for allowance, and allowance of the application is respectfully requested. If the Examiner disagrees with Applicant, or feels that additional clarification is necessary, Applicant's attorney respectfully requests that the Examiner call Applicant's attorney to determine if the issue can be resolved prior to issuance of an additional office action in this matter.

Respectfully submitted,

Date: February 28, 2006

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CERTIFICATE OF MAILING (37 C.F.R. 1.8(a))

I hereby certify that this paper (along with any paper referred to as being transmitted therewith) is being deposited with the United States Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

February 28, 2006

Matthew F. Jodziewicz